

**The Art of Underengineering**  
by Christian Koehler and Robert Weissbarth

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Design-driven cost reduction allows manufacturers to realize savings of 10 to 30 percent for products in development.

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Companies waste billions of dollars every year on new product enhancements that consumers do not want, cannot use, or will not pay for. The fact is that most new products, from automobiles to washing machines, are overengineered.

But corporate efforts to rein in excessive engineering costs frequently fail. CEOs and CFOs at manufacturing companies tell the same story: To achieve a margin on new products, engineers know they need to hit a target cost, but somehow they don't. Why not? Engineers argue they need to spend more to meet consumers' expectations.

This problem is especially acute in the automotive industry, where consumers have come to expect much more for less. In the past, vehicle manufacturers got around the problem of meeting consumer demands without raising costs by putting pressure on suppliers. But the

returns on this strategy are diminishing, because today's automotive suppliers, struggling to survive, have no more margins to squeeze.

## Design-Driven Cost Reduction

There is an alternative: design-driven cost reduction, a methodology for taking out cost by modifying the product design of both current products and products in development. Design-driven cost reduction is especially important in the automotive industry, but it can be applied to nearly all manufactured products.

For most assembled products, including automobiles, the cost of components and materials from suppliers typically accounts for 40 to 60 percent of the final price. To protect their margins, manufacturing companies continually chip away at costs. Automotive companies generally rely on purchasing departments to cut costs by 3 percent a year; at a company with sales

of \$100 billion spending \$40 billion on raw materials, that could mean \$1.2 billion in annual savings. In practice, they are lucky to achieve 1 to 2 percent reductions.

On average, 70 percent of the cost of any new product is fixed by the specifications and design. In other words, more than two-thirds of the total cost is designed into the product. By identifying what is integral to an automobile's appeal and what is an expensive waste, manufacturers can modify the product design to dramatically reduce unit costs and give consumers the products they want at competitive prices.

In practice, realizing savings through design is extremely challenging. Most cost-reduction initiatives that attack the design process don't stick, no matter whether the ideas come from a "value analysis" (taking out cost without compromising value) of an existing product or a "value engineering" approach to

designing a new product. Resistance to new ideas also keeps design changes from being implemented.

### Idea Owners

Although value analysis and value engineering can identify potential savings, true design-driven cost reduction does much more. It combines idea generation with analysis to establish clear targets for cost savings. It sets a timetable to ensure fast action and infuses collaboration and flexibility into the implementation process. It is cross-functional; it can be customized for specific engineered products; and it embraces commercial as well as technical improvements. Engineers become “idea owners” and are held accountable for a cost-reduction proposal from beginning to end.

Using design-driven cost reduction, manufacturers can achieve an additional 3 percent annual savings for current products; savings can reach 10 to 30 percent for products in development. The European division of one global vehicle manufacturer introduced design-driven cost reduction in 2001. A team of 200 engineers generated and evaluated ideas to take cost out of product design. This co-located group, which reported directly to top management, was freed of other responsibilities to focus exclusively on the effort. (Previous cost-reduction programs were part-time projects and lacked management support and targets.) The result: cost savings of more than \$400 million over the first 30 months. Similar programs at another manufacturer have yielded 20 percent savings in three years.

Design-driven cost reduction has four cornerstones:

- **Process discipline** is imposed at every stage: idea generation, evaluation and prioritization, and implementation through production. Each step has an expected duration, and every idea is tracked. A highly disciplined approach to validation and implementation ensures that the cost benefits are realized in the shortest possible time.

- **Target setting and transparent reporting** add to the discipline. Targets for cost reduction are derived from competitive benchmarking, component by component. Suppliers play a valuable role here in assessing cost differences. Transparent reporting ensures that deviations from targets are quickly corrected.

- **A cross-functional organization** that removes organizational barriers — physical and cultural — is essential to fostering collaboration. Soft management issues, especially culture change, play a vital role in reducing natural conflicts among engineering, purchasing, and marketing.

- **Management commitment** empowers design-driven cost reduction teams to make and implement difficult decisions. Key supporting management roles include setting targets, reviewing progress, removing roadblocks, and supporting critical decision trade-offs among product cost, weight, performance, and functionality.

Design-driven cost reduction is not a panacea. But it is a powerful management resource to help companies realize better margins — not at the expense of their suppliers and customers, but through better design that benefits everyone. ✦

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